

Field Conservation on the *Housatonic* and *Hunley* Shipwreck Excavations

I dove every day, two times a day for two weeks in October 1999, on the site of the Civil War submarine *H.L. Hunley*, and did not see the submarine once. It was there; we were not in the wrong place. However, such was the blackness of the muddy South Carolina coastal waters that we could only feel the iron vessel, not see it. It takes a little time to get used to doing archeological conservation essentially blindfolded. As a diving archeological conservator, I was removing layers of rock-hard concretion—a mixture of marine organisms, sediment, and metal corrosion that had formed over time—from small areas of the submarine's surface in order to get information about the condition of the metal beneath. It was certainly one of the more challenging condition reports I've had to write.

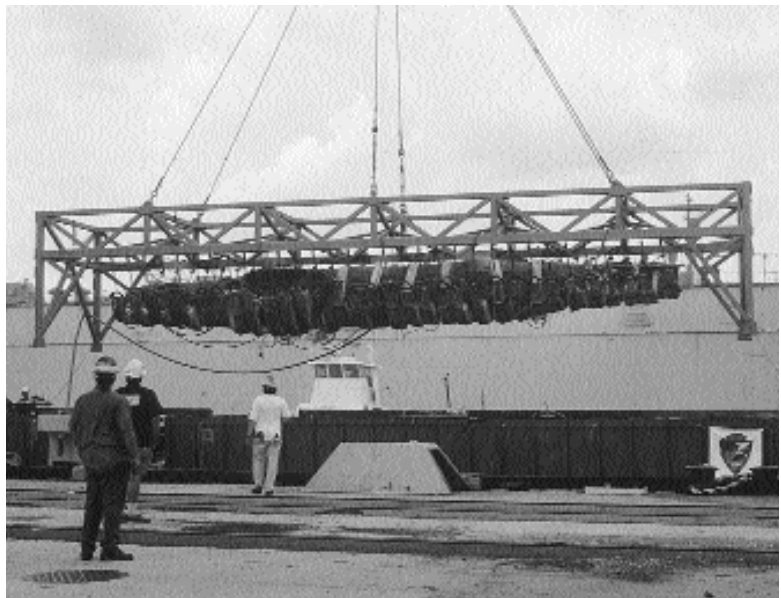
Doing conservation with underwater archeologists means a conservator might work on a cramped and lurching boat, on a sandy beach, on a noisy platform miles offshore, or even 30 feet down in black, muddy water. Working underwater requires some adapting of traditional conservation methods and materials to get the job done. The problems are the same as on-land excavations: we need to identify, strengthen, support, lift, and stabilize fragile artifacts. But a slightly different tool kit is needed. For example, the water-based and solvent-based adhesives and consolidants that are the staples of on-site archeological conservation on land sites are useless underwater! Instead we use materials such as underwater-setting epoxies, plumber's pipe-repair tape, plaster of Paris, sand, mud, resin-impregnated medical

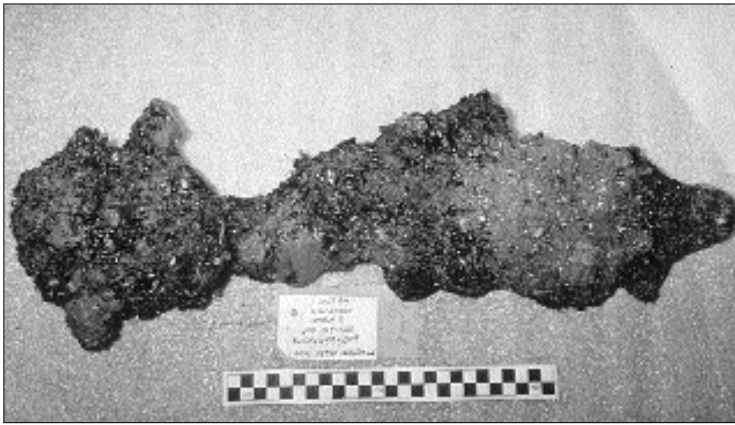
bandages, silicone rubber, aluminum foil, dental molding putty, polysulfide rubber molding compound, scraps of wetsuits, and expanding polyurethane foam, to name only a few of the substances that can help to gather information or provide support and strength to objects underwater.

Working on the *Hunley* site in October, we could not see, we could only feel. Therefore, to gather condition information that was more than verbally descriptive and subjective, we used dental molding putty to take molds of the metal plates and rivet heads in the small areas of the submarine's surface from which we removed concretion. The two-part putty could be mixed underwater, pressed onto the metal surface, and pulled off after five minutes of curing. The molds were finely detailed, and provided technological and corrosion information the Oceaneering International engineers needed to refine their plan for raising the submarine from the seabed the following year, 2000.

During this short project, we did not raise any artifacts, so the conservation requirements were quite minimal. However, underwater arche-

Hunley suspended in its lifting cradle after it was raised from the seabed. The backbone of the cradle consists of a steel framework with four legs. On the seabed, one at a time, 32 heavy nylon slings were placed under the submarine and attached to the steel framework. Extruded foam inserts, or "pillows" were formed-fitted to the hull surface for maximum support.





Typical concretion from USS Housatonic.

ology can be a conservation-intensive undertaking if artifacts are raised, or even if structures and objects are only uncovered, studied and reburied, or are managed *in situ*. Materials that have been immersed in underwater environments for long periods have undergone significant chemical and physical changes, and generally do not react well to being brought into a new environment rich in oxygen, light, and heat. The deterioration problems are often not fully understood, and the required conservation treatments can be long and complex. Many times, an object is not even visible before some kind of conservation treatment is performed on it, so the conservator may be the first one to learn of the materials and details of an object. Underwater archeology is dependent on conservation procedures, so the two disciplines are closely intertwined. The archeologist cannot identify, and therefore cannot interpret, many objects before conservation.

Earlier in 1999, working a few hundred yards from *Hunley* on the site of USS *Housatonic*, the Union vessel sunk by *Hunley*, our team (from the Naval Historical Center, National Park Service, and South Carolina Institute of Archaeology and Anthropology) excavated nearly 100 artifacts from three small test excavation areas. These included leather shoes, a rubber gasket, zinc artillery fuses, wood fragments, a pistol of wood, brass, and iron, and several amorphous, heavily concreted objects ("concretions") that were unidentifiable—even after we brought them up to the surface and could see them. One long, curved concretion was almost certainly a sword. This project

Leather shoe from USS Housatonic.



required a full-time conservation commitment, not only in the water, but also back on land, and long after the excavation season was over.

We knew that the *Housatonic* wreck would probably contain typical shipboard artifacts of many different sizes, shapes, materials, and conditions, and we had planned carefully for the excavation. This planning is the crucial first step in any excavation project, and always includes the archeologists and conservators, and possibly other specialists such as engineers, microbiologists, or geologists, depending on the scale and nature of the project. Working on shipwreck sites can involve handling objects from the tiniest button or textile fragment to enormous cannon, anchors, and ship timbers, or even entire ship structures. For the task of raising the 40-foot long, 16-ton *Hunley* intact from the seabed in August 2000, intensive planning by archeologists, conservators, engineers, corrosion scientists, geologists, architects, and many others began years before the operation.

For the *Housatonic* project, I had brought everything that would be needed for on-site conservation. This meant dozens of plastic, sealable, Tupperware-type containers and self-seal, Ziplok-type bags of every shape and size for individual artifacts, as well as larger, sturdy, stackable containers for bulk storage. Other essential waterproof supplies include Tyvek for tags, Mylar frosted drafting film for drawings, non-corroding brass nails for tagging wood or for custom-building crates, Sharpie permanent markers for waterproof and fade-proof writing, stainless steel tools that won't rust in the salt air and water, hard plastic slates for drawing underwater and for object supports, thin polyethylene foam for padding and support, and rolls of plastic sheeting for covering work tables, wrapping large artifacts, and lining makeshift storage tanks.

X-raying USS
Housatonic arti-
facts at the
Medical
University of
South Carolina.



Anchored four miles offshore over the wreck of *Housatonic*, our dive boat was small and was filled almost entirely with people, dive equipment, and the excavation dredge motor. There was little room for artifact storage, and artifact drawing was impossible on the choppy seas. The most that could be done on the boat was to keep a running log of artifact numbers, write identification tags as the artifacts were brought up, and store the artifacts safely in a box of sea water. When possible, the objects were immediately photographed. At the end of the diving day, we motored back to port, and then the conserving day began and continued into late evening. The objects were brought back to the dig house, where the conservation lab consisted of the kitchen sink and the back porch, both frequented by hordes of fire ants.

Usually the routine consisted of gently rinsing off loose mud and sand, then fully describing, drawing, and photographing each object. This is always the first priority for the objects: record, record, record. Objects from underwater environments can undergo rapid changes after excavation, sometimes with a loss of information. After the objects were cataloged, they were stored in basins of clean fresh water or sea water, depend-

ing on the material, in containers that would be used to transport them to the laboratory at the end of the field project.

On the *Housatonic* project, several days of rough seas kept us from going offshore to excavate, so this allowed time to do some active conservation on the artifacts and get some of them fully treated by the end of the six-week excavation season. I had brought a deionizing column and portable conductivity meter, so I began desalination (salt removal) of some materials such as coal, ceramics, glass, and copper-alloy. I also did some short chemical treatments of the ceramics that had organic and iron staining on them. When possible to do so without damage, I removed obscuring concretion to identify an object to help the archeologists interpret the excavation areas. This did not include the unidentified "concretions," which we knew would become damaged and unstable if we began breaking them apart without knowing what was inside.

Most of the conservation treatments could not be done without laboratory facilities. Many of the objects needed to be x-rayed for preliminary identification, followed by technological research, and then long treatment times sometimes using specialized equipment. Examples of typical treatment needs are desalination, concretion removal, polyethylene glycol impregnation and freeze-drying of organic materials, and electrolytic reduction of metals to remove corrosion agents. An added concern for the artillery fuses was that they might still be explosive. Many of the *Housatonic* objects are still being conserved and studied, with the archeologists and conservators working together to reveal and interpret the objects throughout the long processes.

On the *Housatonic* project we were extremely lucky in that the Medical University of South Carolina agreed to x-ray our concretions for us shortly after we had excavated them, so we could begin site interpretation that much sooner. That is when all the bets got paid up. The long, curved concretion that I just knew was a sailor's sword... was a plain old bent iron bolt.

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Photos courtesy U.S. Naval Historical Center.